

Intercomparison of Surface Temperature Variability Simulated by Coupled GCMs

Curt Covey and Benjamin D. Santer
Program for Climate Model Diagnosis and Intercomparison
Lawrence Livermore National Laboratory
Livermore, California USA

ABSTRACT

We have examined the variability of surface air temperature on time scales from seasonal to centennial, as simulated by eight different global coupled ocean-atmosphere general circulation models. The climate simulations represent pre-industrial conditions with external forcing (e.g., greenhouse gases) held fixed. The models include the familiar four contributing to the Intergovernmental Panel on Climate Change's 1992 assessment of future climate (from DKRZ/MPI, GFDL, NCAR and UKMO). These mostly use an arbitrary "flux correction" to avoid climate drift. The four additional models mostly avoid flux correction. We hope to include more models in our study in the future.

Model simulations of unforced internal climate variability are increasingly used for comparison with observations of climate over the past century, in attempts to separate an anthropogenic signal from natural variability "noise." Thus, we feel that a more careful and systematic examination of these results is warranted. The models examined to date exhibit more than a factor-of-two range in seasonal cycle amplitude. Significant differences in variability among the models also appear at interannual, decadal and centennial time scales. Both comparison with observations of high-resolution paleodata and further diagnosis of the model simulations are required in order to assess the realism of the models' long-term variations. These findings reaffirm the need for the Coupled Model Intercomparison Project (CMIP) analogous to the on-going Atmospheric Model Intercomparison Project (AMIP).

This work was sponsored by the U.S. Department of Energy Environmental Sciences Division and performed by the Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.